

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : DAISHINKU CO

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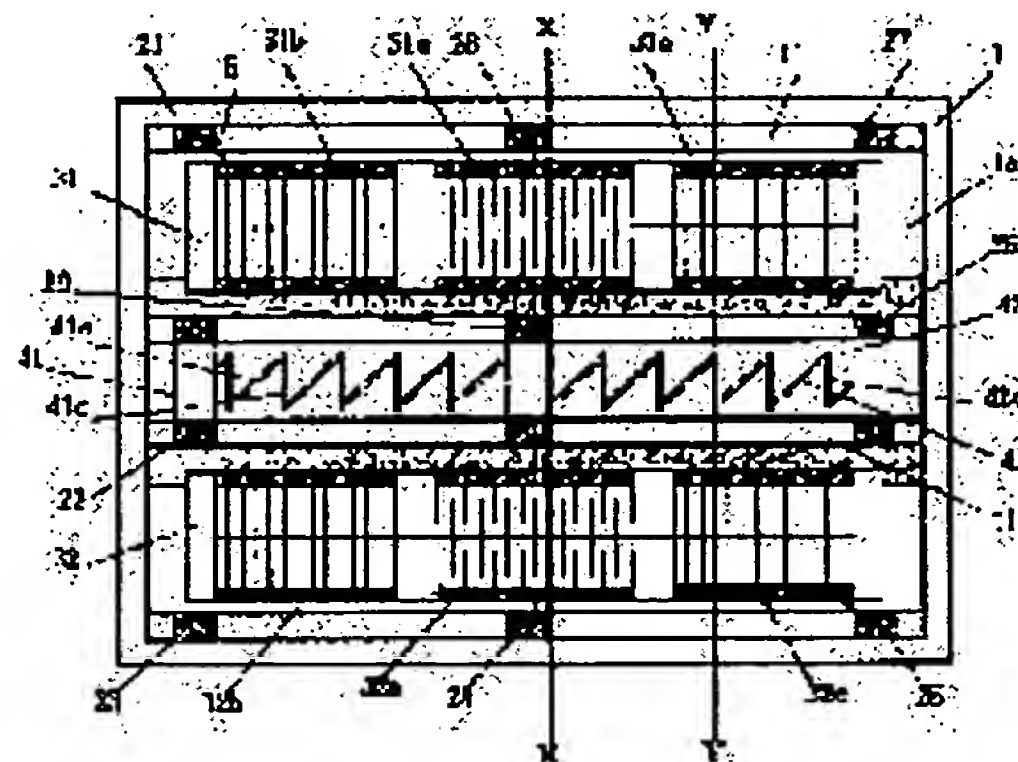
(72)Inventor : IORI KAZUNARI

(54) PACKAGE FOR ELECTRONIC PARTS AND SURFACE ACOUSTIC WAVE FILTER USING THE SAME

(57)Abstract:

PURPOSE: To provide an electronic parts package capable of allowing inductor to correspond to high frequency without reducing its Q value and easily controlling inductance and to provide also a surface acoustic wave filter using the package.

CONSTITUTION: A package consisting of ceramics such as alumina has two-room separated structure consisting of the 1st room C1, the 2nd room C2 and a separation band part B for separating respective rooms C1, C2. Step parts 11 are arranged on the internal peripheral part of the package and the width direction end part of the band part B and electric pads are partially arranged on each step part 11. Inductors 41, 42 are arranged on the upper part of the step part 11 formed on the separation part B by ceramic laminating technology integrally with the package between an electrode pad 29 connected to the I/O electrodes of interdigital electrodes 31a, 32a on piezo-electric bases 31, 32 and grounded electrode pads 22, 26.



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(71) 出願人 000149734

株式会社大真空

兵庫県加古川市平岡町新在家字鴻野1389番地

(72) 発明者 伊折 和成

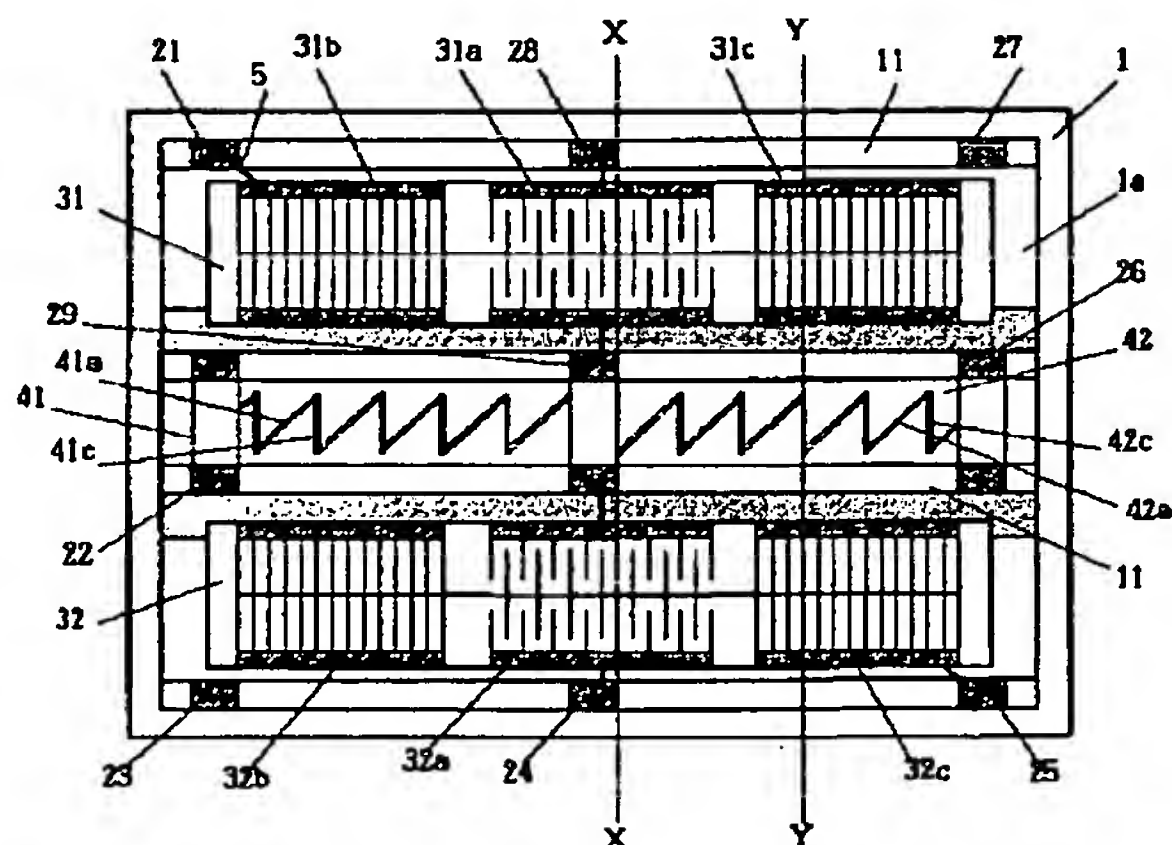
兵庫県加古川市平岡町新在家字鴻野1389番地 株式会社大真空内

(54) 【発明の名称】 電子部品用パッケージおよびこのパッケージを用いた弾性表面波フィルタ

(57) 【要約】

【目的】 インダクタをQ値を低下させずにかつ高周波に対応させ、またインダクタンスも容易に調整することが可能な電子部品用パッケージを提供するとともに、このパッケージを用いた弾性表面波フィルタを提供する。

【構成】 アルミナ等のセラミックからなるパッケージ1は2室分離構造であり、第1室C1と第2室C2とこれら各室を分ける分離帯部Bとからなる。パッケージ内周部分と分離帯部Bの幅方向端部には段部11が設けられており、この段部11の一部には電極パッドが設けられている。分離帯部の前記段部11より上部には、インダクタ41、42がセラミック積層技術によりパッケージと一体的に設けられており、圧電基板31、32上の交差指電極31a、32aの出入力電極がつながる電極パッド29と接地される電極パッド22、26間に配置されている。



## 【特許請求の範囲】

【請求項 1】 電子部品素子を収納するパッケージ内部に、前記電子部品素子と電氣的接続を行う電極パッドを複数ヶ所設けるとともに、インダクタの下層電極を形成するほぼ平行に複数配置された下層ライン電極と、これら下層ライン電極の両端が各々電氣的につながり、上部に延びた複数の中間ライン電極を内部に有するセラミック層と、これら下部ライン電極の一端から延びる中間ライン電極の上端と、隣接する下部ライン電極の他端から延びる中間ライン電極の上端とを各々電氣的に接続する上部ライン電極とからなり、これら各ライン電極で前記セラミック層をコアとしてコイル状の導体路を有するインダクタを前記パッケージに一体的に形成したことを特徴とする電子部品用パッケージ。

【請求項 2】 圧電基板の表面に少なくとも弾性表面波を励起する交差指電極を有する複数の弾性表面波素子と、これら弾性表面波素子を分離収納するとともにこれら弾性表面波素子間に介在し、少なくともインダクタを形成した分離帯部を一体的に有し、かつ数カ所に前記弾性表面波素子を互いに電氣的接続するための電極パッドを有するパッケージと、このパッケージを気密封止する弾性表面波フィルタであって、

前記分離帯部は、下部のセラミック層と、この下部のセラミック層上面の数カ所に前記弾性表面波素子を互いに電氣的接続するための電極パッドと、同じく下部のセラミック層上面の一部にありインダクタの下層電極を形成するほぼ平行に複数配置された下層ライン電極と、これら下層ライン電極の両端が各々電氣的につながり、上部に延びた複数の中間ライン電極を内部に有する上部のセラミック層と、これら下部ライン電極の一端から延びる中間ライン電極の上端と、隣接する下部ライン電極の他端から延びる中間ライン電極の上端とを各々電氣的に接続する上部ライン電極とからなり、これら各ライン電極で前記上部のセラミック層をコアとしてコイル状の導体路を有する分離帯部のインダクタを前記複数の弾性表面波素子と接地電極間に介在するよう構成したことを特徴とする弾性表面波フィルタ。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は圧電基板上を伝搬する弾性表面波を応用した弾性表面波フィルタ等に用いる電子部品用パッケージおよびこのパッケージを用いた弾性表面波デバイスに関するものである。

## 【0002】

【従来の技術】 従来技術を図 5、図 6 とともに説明する。図 5 は、従来の多段接続共振子型弾性表面波フィルタの平面図、図 6 は図 5 の Z-Z 断面図である。圧電基板 7 は薄板状の  $\text{LiNbO}_3$  からなり、矩形形状に加工されている。この圧電基板 7 の表面には、交差指電極 71a、72a 並びに反射器電極 71b、71c、72

b、72c が形成されており、弾性表面波共振器を 2 つ並列に設けてなる 2 対の共振器型弾性表面波フィルタ 71、72 を構成している。セラミック製のパッケージ 1 は概ね下層 1a、中間層 1b、上層 1c、そして金属層 1d の 4 層の積層構造であり、電極を外部に導出する電極パッド 81、82、83、84、85、86 が設けられている。電極形成された圧電基板 7 はこのパッケージの中に収納され、ボンディングワイヤーで前記電極パッドと電氣的に接続される。共振子型弾性表面波フィルタ 71、72 の内側の交差指電極は共通接続され、バス電極 73 にて圧電基板の対向する 2 角に導出されている。なお、電極パッド 83、86 はそれぞれ入出力電極として外部に導出され、電極パッド 81、84 は第 1 の接地電極として外部に導出され、電極パッド 82、85 は第 2 の接地電極として外部に導出されている。最後に金属性のフタ 6 と金属層 1d とをシーム溶接で気密封止する。

## 【0003】

【発明が解決しようとする課題】 このような弾性表面波共振子型フィルタは、通常前記第 1、第 2 の接地電極は共通接続され、他の回路素子を付加せずにフィルタとして使用されるが、要求されるフィルタの通過帯域特性によっては、前記第 1 の接地電極にインダクタ等の回路素子を追加して接地することにより、通過帯域特性等の電氣的諸特性を調整することがあった。このような場合、パッケージ内にチップインダクタを組み込むことが考えられるが、一般にチップインダクタは弾性表面波のような高周波には対応しておらず、対応していたとしても高価であったり、別途収納スペースが必要になるという欠点を有していた。また、他のインダクタを必要とする電子部品においても、パッケージが大型化する等の問題を有していた。

【0004】 本発明は上記問題点を解決するためになされたもので、多段接続弾性表面波フィルタのようにインダクタを必要とする場合のある電子部品において、このインダクタを Q 値を低下させずにかつ高周波に対応させ、またインダクタンスも容易に調整することが可能な電子部品用パッケージを提供するとともに、このパッケージを用いた弾性表面波フィルタを提供することを目的とする。

## 【0005】

【課題を解決するための手段】 上記問題点を解決するために、本発明による電子部品用パッケージは、電子部品素子を収納するパッケージ内部に、前記電子部品素子と電氣的接続を行う電極パッドを複数ヶ所設けるとともに、インダクタの下層電極を形成するほぼ平行に複数配置された下層ライン電極と、これら下層ライン電極の両端が各々電氣的につながり、上部に延びた複数の中間ライン電極を内部に有するセラミック層と、これら下部ライン電極の一端から延びる中間ライン電極の上端と、隣



接する下部ライン電極の他端から延びる中間ライン電極の上端とを各々電氣的に接続する上部ライン電極とからなり、これら各ライン電極で前記セラミック層をコアとしてコイル状の導体路を有するインダクタを前記パッケージに一体的に形成したことを特徴とする。磁束密度を向上させるにはこのコアとなるセラミック層を磁性体で形成するとよい。

【0006】また上記電子部品用パッケージを用いた弾性表面波フィルタは、圧電基板の表面に少なくとも弾性表面波を励起する交差指電極を有する複数の弾性表面波素子と、これら弾性表面波素子を分離収納するとともにこれら弾性表面波素子間に介在し、少なくともインダクタを形成した分離帯部を一体的に有し、かつ数カ所に前記弾性表面波素子を互いに電氣的接続するための電極パッドを有するパッケージと、このパッケージを気密封止する弾性表面波フィルタであって、前記分離帯部は、下部のセラミック層と、この下部のセラミック層上面の数カ所に前記弾性表面波素子を互いに電氣的接続するための電極パッドと、同じく下部のセラミック層上面の一部にありインダクタの下層電極を形成するほぼ平行に複数配置された下層ライン電極と、これら下層ライン電極の両端が各々電氣的につながり、上部に延びた複数の中間ライン電極を内部に有する上部のセラミック層と、これら下部ライン電極の一端から延びる中間ライン電極の上端と、隣接する下部ライン電極の他端から延びる中間ライン電極の上端とを各々電氣的に接続する上部ライン電極とからなり、これら各ライン電極で前記上部のセラミック層をコアとしてコイル状の導体路を有する分離帯部のインダクタを前記複数の弾性表面波素子と接地電極間に介在するよう構成したことを特徴とする。

【0007】

【作用】電子部品用パッケージ内部に、セラミック積層技術とメタライズ技術によりセラミック積層部にコイルの導体路（ライン電極）で構成したインダクタを形成しているので、比較的大きな面積をインダクタの形成に充てることができる。よって、ライン電極の間隔、巻き数等のインダクタとしての電氣的諸特性に係る設計の自由度が大きく、高周波化に対応したインダクタが形成できる。インダクタを形成する上部ライン電極は別途セラミック層等で被覆してもよいが、露出させた状態でこれら上部ライン電極を短絡させることにより、あるいは予め短絡した上部ライン電極を切断していくことにより、インダクタンスの調整が極めて容易に行える。

【0008】またこのパッケージを用いて共振子型の弾性表面波フィルタを構成することにより、弾性表面波フィルタを構成する電極と各電極パッドを接合し、必要に応じてインダクタを構成する上部ライン電極を短絡、切断することによりインダクタンスの調整ができるので、通過帯域特性の調整が容易となる。

【0009】

【実施例】本発明による実施例を図面とともに説明する。図1は本発明による電子部品用パッケージを用いた弾性表面波フィルタの平面図、図2は図1のX-X断面図、図3は図1のY-Y断面図である。アルミナ等のセラミックからなるパッケージ1は2室分離構造であり、第1室C1と第2室C2とこれら各室を分ける分離帯部Bとからなる。パッケージ内周部分と分離帯部Bの幅方向端部には段部11が設けられており、この段部11の一部には電極パッド21、22、23、24、25、26、27、28が設けられている。パッケージの底部には接地されるシールド電極12が設けられている。パッケージの開口部分はコパールからなる金属枠（金属層）1dがロウ付け接合されている。分離帯部の前記段部11より上部には、インダクタ41、42がセラミック積層技術によりパッケージと一体的に設けられており、後述の電子部品素子である圧電基板31、32上の交差指電極31a、32aの出入力電極がつながる電極パッド29と接地される電極パッド22、26間に配置されている。

【0010】このようなセラミック製のパッケージは次のような積層順序にて製造される。パッケージの下部を構成する板状の第1のセラミック層1aの上部に、この第1のセラミック層1aの周囲並びに同じく短手方向中央部で長手方向に延在する部分（前述の分離帯部に相当）と重なる枠状の第2のセラミック層1bが設置される。この第2のセラミック層1bの上部の一部には前述の電極パッドに相当するメタライズ層が設けられ、かつ前記分離帯部Bに相当する部分の電極パッド22-29間あるいは電極パッド26-29間にはインダクタの下部ライン電極41a、42aを構成する複数の細幅線状のメタライズ層が、斜めにかつ等間隔で設けられている。前記分離帯部に相当する部分のメタライズ層の上部には第3のセラミック層1cが設けられている。この第3のセラミック層1cには前記下部ライン電極の各端部に対応する部分に小さな貫通孔が設けられ、この孔にも電極材料を吸引して内周面に固着させることにより中間ライン電極41b、42bが設けられている。この第3のセラミック層1cは、中間ライン電極41b、42bの下端と前記下部ライン電極41a、42aの端部とが電氣的に接続されるよう配置されている。そして、下部ライン電極の一端から延びる中間ライン電極の上端と、隣接する下部ライン電極の他端から延びる中間ライン電極の上端とを各々電氣的に接続する細幅線状の上部ライン電極41c、42cが、この分離帯部に相当する第3のセラミック層の上部に等間隔に形成されている。また、前記第2のセラミック層の外周上部には第2のセラミック層の外周幅より小さな幅の第3のセラミック層1cが設けられている。なお、パッケージ外周を構成する第3のセラミック層とパッケージの分離帯部を構成する第3のセラミック層は、同一の工程で積層してもよい

し、あるいは異なった工程で積層し、材料、高さを異ならせてもよい。第3のセラミック層の上部には、周状の金属棒1dがロウ接される。このようにしてパッケージを構成することにより分離帯部で仕切られた2つの電子部品素子収納室を作り出すとともに、分離帯部の上部においては第3のセラミック層をコアとして前記各ライン電極がその周囲を螺旋状に延びた構成によりインダクタを形成することができる。

【0011】電子部品素子である圧電基板31、32は薄板状のLiNbO<sub>3</sub>からなり、それぞれ矩形形状に加工されている。これら圧電基板31、32の表面には、それぞれ交差指電極31a、32a並びに反射器電極31b、31c、32b、32cが形成されている。各圧電基板上の各電極は弾性表面波共振器を2つ並列に設けてなる共振器型弾性表面波フィルタを構成している。これら圧電基板31、32を前記パッケージの各収納室に設置し、パッケージの底部と圧電基板の下面を導電性接合材で接合する。そして、電極パッド28と交差指電極31aの一端、交差指電極31aの他端と電極パッド29、同じく電極パッド29と交差指電極32aの一端、交差指電極32aの他端と電極パッド24、反射器電極31b（反射器電極31c）と電極パッド21、反射器電極32c（反射器電極32b）と電極パッド25をそれぞれボンディングワイヤー5で電氣的に接合する。そして、電極パッド28、24は入出力電極として外部に導出され、電極パッド21、23、25、27はそれぞれ接地電極として外部に導出される。なお、電極パッド29からインダクタ41を介してつながる電極パッド22、あるいはインダクタ42を介してつながる電極パッド26は、図示していないがパッケージ内で前記接地される電極パッドと共通接続されて外部に導出される。金属性のフタ6は前記金属棒1dとシーム溶接等により気密的に接合される。

【0012】他の実施例を図4の平面図に示す。なお、最初の実施例と同じ構造部分については同番号を援用する。この実施例では、中間ライン電極がコアとなる第3のセラミック層の側面に形成された切り欠き部分を延在する構成となっており、これは焼結前のグリーンシート状態で複数の透孔を設け、この透孔部分を切断することにより上記切り欠きを設けることができる。インダクタ41、42を構成する上部ライン電極41c、42cは、当該面上で短絡ライン電極41d、42dにより一部あるいは全部が短絡されている。通過帯域特性を調整する場合は、この共通ライン電極をレーザー等により順次溶断し、所望の特性となったところで切断を中止す

ば良く、より容易に電氣的特性の調整が行える利点を有している。なお、本発明は上記実施例で示した共振子型弾性表面波フィルタのみに適用されるものではなく、例えばモノリシック水晶フィルタ等の他の複合化された電子部品に適用できるものである。また、共振子型弾性表面波フィルタの電極パターン並びにパッケージに形成された配線電極パターンも上記実施例に限定されるものではなく、所望の電氣的特性に応じて適宜選択設計すればよい。

#### 10 【0013】

【発明の効果】電子部品用パッケージ内部に、セラミック積層技術とメタライズ技術によりセラミック積層体にコイル状の導体路（ライン電極）で構成したインダクタを形成しているため、比較的大きな面積をインダクタの形成に充てることができる。よって、ライン電極の間隔、巻き数等のインダクタとしての電氣的諸特性に係る設計の自由度が大きく、高周波化に対応したインダクタが形成できる。よって、新たにインダクタを用意する必要がなくなる。また、インダクタを形成する上部ライン電極が露出しているため、これら上部ライン電極を短絡させることにより、あるいは予め短絡した上部ライン電極を切断していくことにより、インダクタンスの調整が極めて容易に行える。

【0014】またこのパッケージを用いて弾性表面波フィルタを構成することにより、インダクタを新たに外部接続する必要もなくなる。そして、必要に応じてインダクタを構成する上部ライン電極を短絡、切断することによりインダクタンスの調整ができるので、通過帯域特性の調整が容易となる。

#### 30 【図面の簡単な説明】

【図1】第1の実施例を示す平面図。

【図2】図1のX-X断面図。

【図3】図1のY-Y断面図。

【図4】他の実施例を示す平面図。

【図5】従来例を示す平面図。

【図6】図5のZ-Z断面図。

#### 【符号の説明】

1 パッケージ

31、32、7 圧電基板

40 41、42 インダクタ

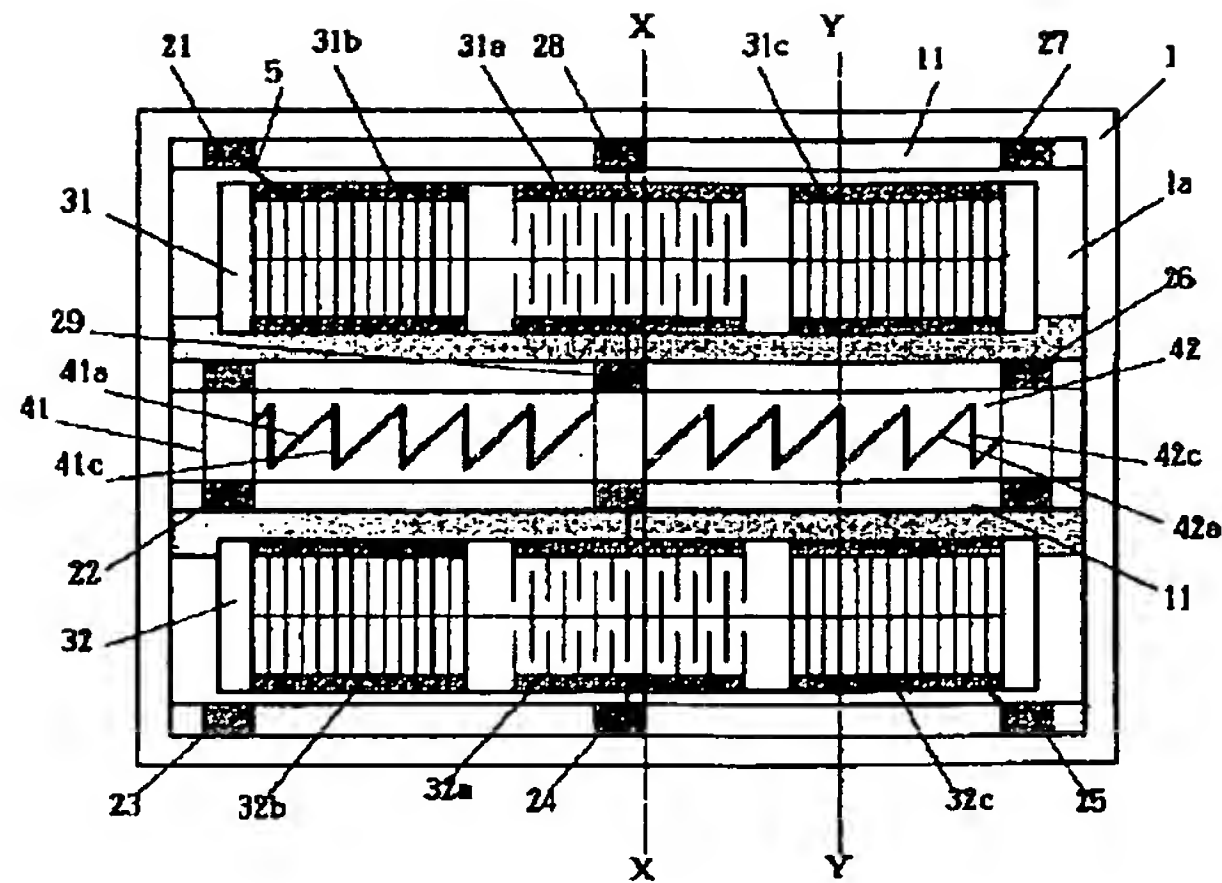
41a、42a 下部ライン電極

41b、42b 中間ライン電極

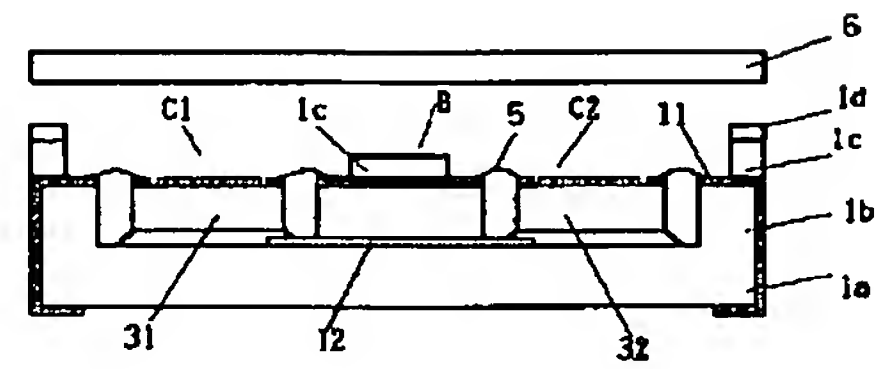
41c、42c 上部ライン電極

41d、42d 短絡ライン電極

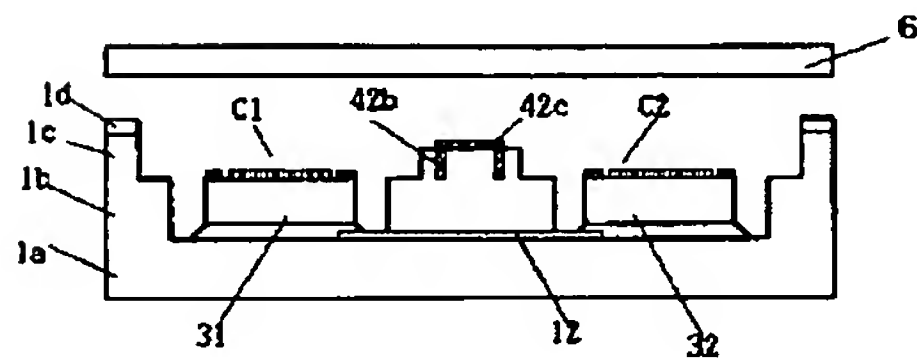
【図1】



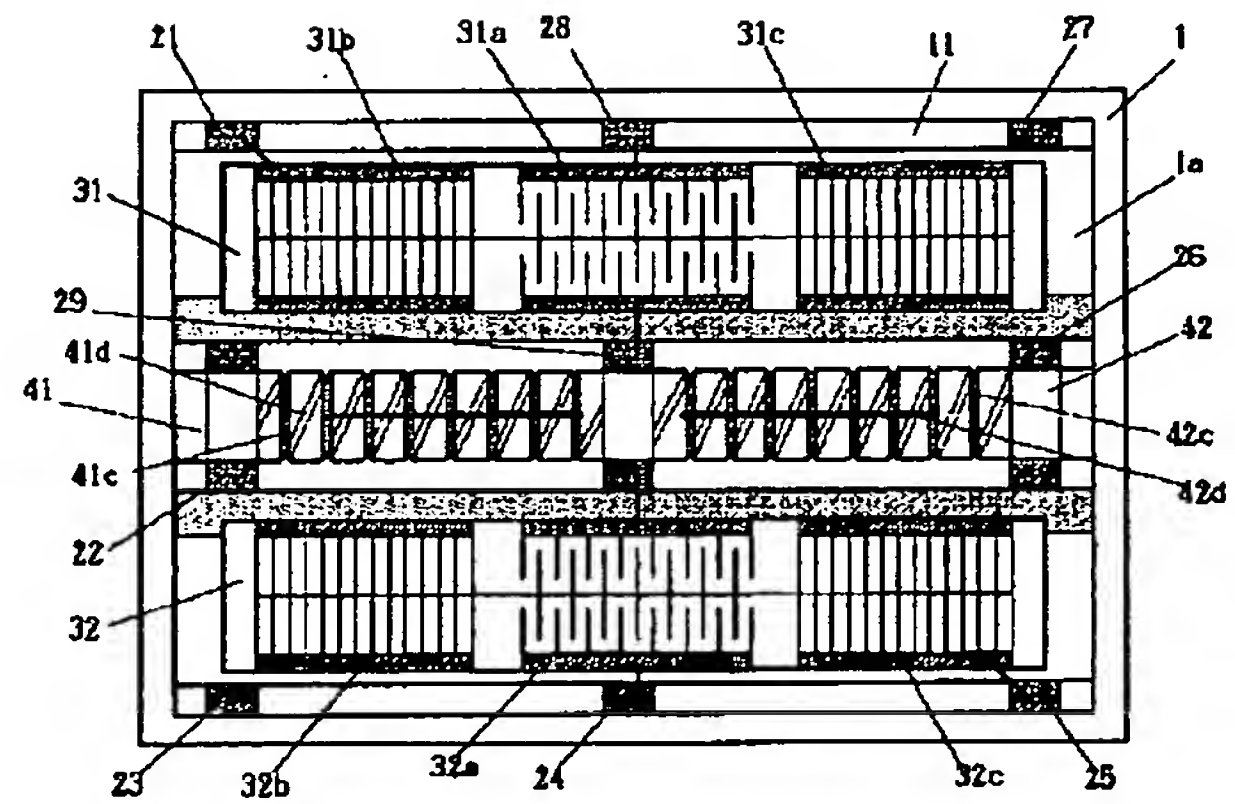
【図2】



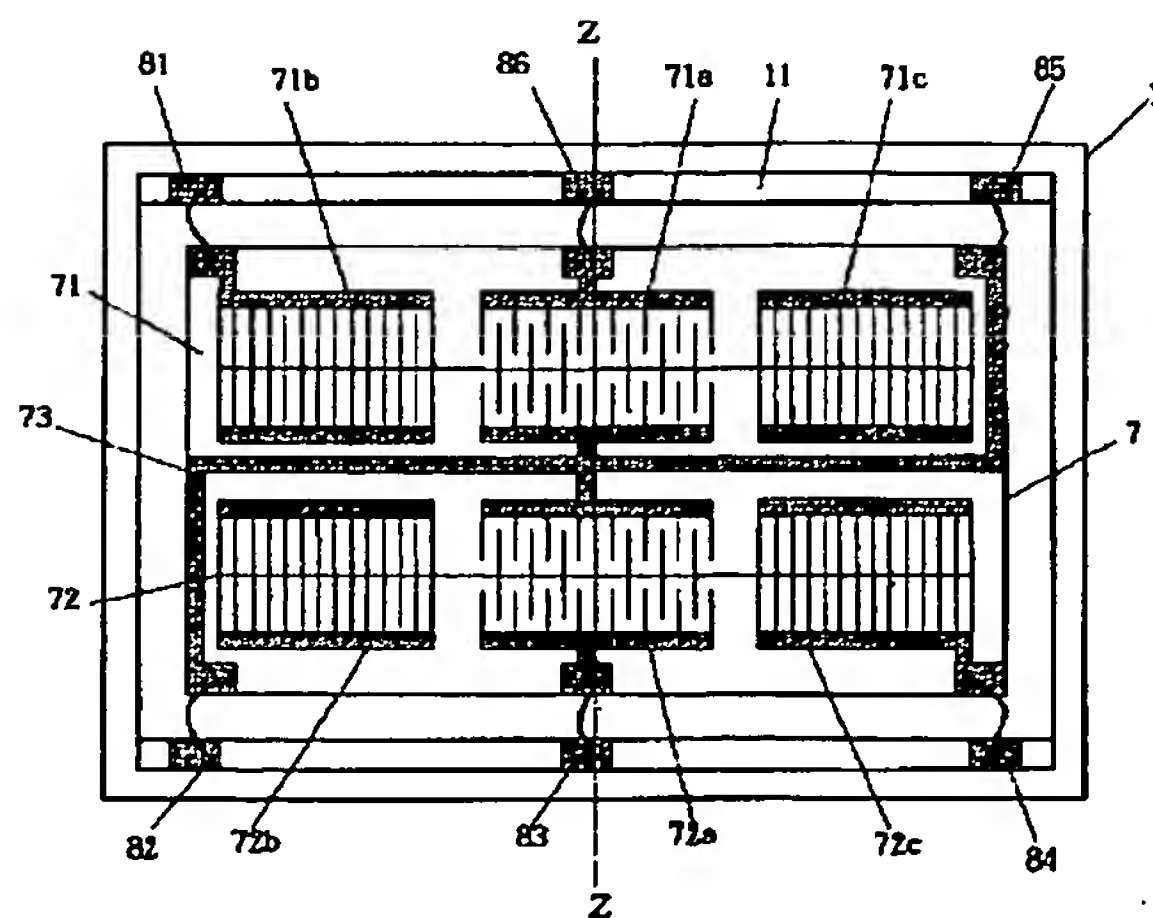
【図3】



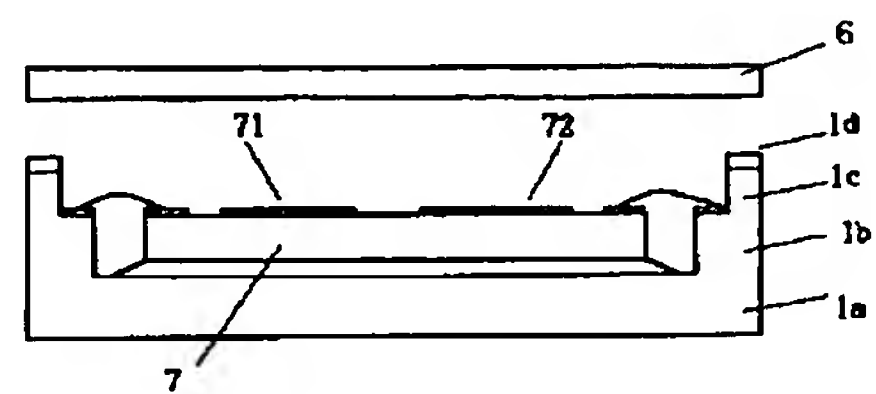
【図4】



【図5】



【図6】





# PATENT ABSTRACTS OF JAPAN

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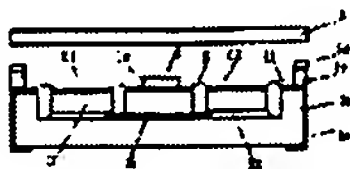
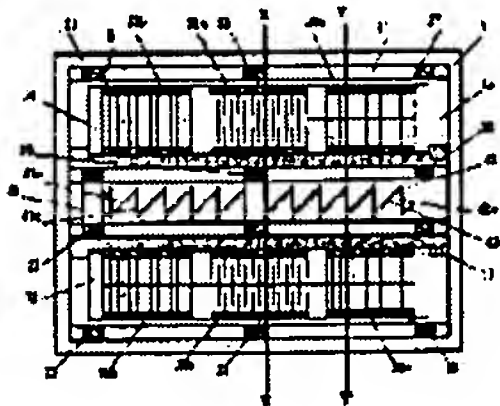
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(21)Application number : 04-327197 (71)Applicant : DAISHINKU CO

(22)Date of filing : 11.11.1992 (72)Inventor : IORI KAZUNARI

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(54) PACKAGE FOR ELECTRONIC PARTS AND SURFACE ACOUSTIC WAVE FILTER USING THE SAME



(57)Abstract:

PURPOSE: To provide an electronic parts package capable of allowing inductor to correspond to high frequency without reducing its Q value and easily controlling inductance and to provide also a surface acoustic wave filter using the package.

CONSTITUTION: A package consisting of ceramics such as alumina has two-room separated structure consisting of the 1st room C1, the 2nd room C2 and a

separation band part B for separating respective rooms C1, C2. Step parts 11 are arranged on the internal peripheral part of the package and the width direction end part of the band part B and electric pads are partially arranged on each step part 11. Inductors 41, 42 are arranged on the upper part of the step part 11 formed on the separation part B by ceramic laminating technology integrally with the package between an electrode pad 29 connected to the I/O electrodes of interdigital electrodes 31a, 32a on piezo-electric bases 31, 32 and grounded electrode pads 22, 26.

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## LEGAL STATUS

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## CLAIMS

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[Claim(s)]

[Claim 1] While preparing two or more electrode pads which perform said electronic-parts component and electrical installation in the interior of the package which contains an electronic-parts component The lower layer Rhine electrode which forms the lower layer electrode of an inductor and by which two or more arrangement was carried out almost in parallel, The ceramic layer which has two or more middle Rhine electrodes with which the both ends of these lower layer Rhine electrode were electrically connected respectively, and extended in the upper part inside, It consists of an up Rhine electrode which connects respectively electrically the upper limit of the middle Rhine electrode prolonged from the end of these lower Rhine electrode, and the upper limit of the middle Rhine electrode prolonged from the other end of an adjoining lower Rhine electrode. each [ these ] Rhine electrode -- said ceramic layer -- a core -- carrying out -- a coiled form conductor -- the package for electronic parts characterized by forming in said package in one the inductor which has a way.

[Claim 2] Two or more surface acoustic elements which have the crossover finger electrode which excites a surface acoustic wave at least on the front face of a piezo-electric substrate, While carrying out the separation receipt of these surface acoustic elements, it intervenes among these surface acoustic elements. The package which has an electrode pad for having in one the separation belt part which formed the inductor at least, and carrying out electrical installation of

said surface acoustic element of each other to several places, It is the surface acoustic wave filter which carries out the hermetic seal of this package. Said separation belt part A lower ceramic layer and the electrode pad for carrying out electrical installation of said surface acoustic element of each other to several [ on the top face of a ceramic layer of this lower part ], The lower layer Rhine electrode which a part of lower ceramic layer top face similarly has, and forms the lower layer electrode of an inductor and by which two or more arrangement was carried out almost in parallel, The ceramic layer of the upper part which has two or more middle Rhine electrodes with which the both ends of these lower layer Rhine electrode were electrically connected respectively, and extended in the upper part inside, It consists of an up Rhine electrode which connects respectively electrically the upper limit of the middle Rhine electrode prolonged from the end of these lower Rhine electrode, and the upper limit of the middle Rhine electrode prolonged from the other end of an adjoining lower Rhine electrode. each [ these ] Rhine electrode -- the ceramic layer of said upper part -- a core -- carrying out -- a coiled form conductor -- the surface acoustic wave filter characterized by constituting the inductor of a separation belt part which has a way so that it may be placed between said two or more surface acoustic elements and touch-down inter-electrode.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the package for electronic parts used for the surface acoustic wave filter adapting the surface acoustic wave which spreads a piezo-electric substrate top etc., and the surface acoustic wave device using this package.

[0002]

[Description of the Prior Art] The conventional technique is explained with drawing 5 and drawing 6 . Drawing 5 is the top view of the conventional multistage connection resonator mold surface acoustic wave filter, and drawing 6 is the Z-Z sectional view of drawing 5 . The piezo-electric substrate 7 consists of sheet metal-like LiNbO<sub>3</sub>, and is processed into the rectangle configuration. In the front face of this piezo-electric substrate 7, the reflector electrodes 71b, 71c, 72b, and 72c are formed in crossover finger electrode 71a and 72a list, and two pairs of resonator mold surface acoustic wave filters 71 and 72 which come to prepare a surface acoustic wave resonator in 2 juxtaposition are constituted. The packages 1 made from a ceramic are lower layer 1a, interlayer 1b, upper 1c, and the laminated structure of four layers of 1d of metal layers in general, and the electrode pads 81, 82, 83, 84, 85, and 86 which derive an electrode outside are formed. The piezo-electric substrate 7 by which electrode formation was carried out is contained in this package, and is electrically connected with said electrode pad by the bonding wire. Common connection of the crossover finger electrode inside the resonator mold surface acoustic wave filters 71 and 72 is made, and it is drawn by two angles which a piezo-electric substrate counters with the bus electrode 73. In addition, the electrode pads 83 and 86 are drawn outside as an I/O electrode, respectively, the electrode pads 81 and 84 are drawn outside as the 1st earth electrode, and the electrode pads 82 and 85 are drawn outside as

the 2nd earth electrode. The hermetic seal of a metallic free wheel plate 6 and 1 metallic of metal layers is carried out to the last by seam welding.

[0003]

[Problem(s) to be Solved by the Invention] Such a surface acoustic wave resonator mold filter might usually adjust many electric properties, such as a passband property, by making common connection of said 1st and 2nd earth electrode, and adding and grounding circuit elements, such as an inductor, to said 1st earth electrode depending on the passband property of a filter demanded, although used as a filter, without adding other circuit elements. In such a case, although it was possible to incorporate a chip inductor in a package, generally, the chip inductor did not correspond to a RF like a surface acoustic wave, but had the fault that it is expensive though it corresponds, or storage space was needed separately. Moreover, also in the electronic parts which need other inductors, it had the problem of a package being enlarged.

[0004] While offering the package for electronic parts which were made in order that this invention might solve the above-mentioned trouble, and this inductor is made to correspond to a RF in the electronic parts which are in the case of needing an inductor like a multistage connection surface acoustic wave filter, without reducing Q value, and can also adjust an inductance easily, it aims at offering the surface acoustic wave filter using this package.

[0005]

[Means for Solving the Problem] In order to solve the above-mentioned trouble, the package for electronic parts by this invention While preparing two or more electrode pads which perform said electronic-parts component and electrical installation in the interior of the package which contains an electronic-parts component The lower layer Rhine electrode which forms the lower layer electrode of an inductor and by which two or more arrangement was carried out almost in parallel, The ceramic layer which has two or more middle Rhine electrodes with which the both ends of these lower layer Rhine electrode were electrically connected respectively, and extended in the upper part inside, It



consists of an up Rhine electrode which connects respectively electrically the upper limit of the middle Rhine electrode prolonged from the end of these lower Rhine electrode, and the upper limit of the middle Rhine electrode prolonged from the other end of an adjoining lower Rhine electrode. each [ these ] Rhine electrode -- said ceramic layer -- a core -- carrying out -- a coiled form conductor -- it is characterized by forming in said package in one the inductor which has a way. It is good to form the ceramic layer which serves as this core for raising flux density with the magnetic substance.

[0006] Moreover, the surface acoustic wave filter using the above-mentioned package for electronic parts Two or more surface acoustic elements which have the crossover finger electrode which excites a surface acoustic wave at least on the front face of a piezo-electric substrate, While carrying out the separation receipt of these surface acoustic elements, it intervenes among these surface acoustic elements. The package which has an electrode pad for having in one the separation belt part which formed the inductor at least, and carrying out electrical installation of said surface acoustic element of each other to several places, It is the surface acoustic wave filter which carries out the hermetic seal of this package. Said separation belt part A lower ceramic layer and the electrode pad for carrying out electrical installation of said surface acoustic element of each other to several [ on the top face of a ceramic layer of this lower part ], The lower layer Rhine electrode which a part of lower ceramic layer top face similarly has, and forms the lower layer electrode of an inductor and by which two or more arrangement was carried out almost in parallel, The ceramic layer of the upper part which has two or more middle Rhine electrodes with which the both ends of these lower layer Rhine electrode were electrically connected respectively, and extended in the upper part inside, It consists of an up Rhine electrode which connects respectively electrically the upper limit of the middle Rhine electrode prolonged from the end of these lower Rhine electrode, and the upper limit of the middle Rhine electrode prolonged from the other end of an adjoining lower Rhine electrode. each [ these ] Rhine electrode -- the ceramic layer of said upper part --

a core -- carrying out -- a coiled form conductor -- it is characterized by constituting the inductor of a separation belt part which has a way so that it may be placed between said two or more surface acoustic elements and touch-down inter-electrode.

[0007]

[Function] the interior of the package for electronic parts -- a ceramic laminating technique and a metallizing technique -- the ceramic laminating section -- the conductor of a coil -- since the inductor constituted on the road (Rhine electrode) is formed, a comparatively big area is assignable to formation of an inductor.

Therefore, the degree of freedom of the design concerning many electric properties as inductors, such as spacing of the Rhine electrode and a number of turns, is large, and the inductor corresponding to RF-izing can be formed.

Although the up Rhine electrode which forms an inductor may be separately covered with a ceramic layer etc., adjustment of an inductance can carry out very easily short-circuiting these up Rhine electrode in the condition of having made it exposing, or by disconnecting the up Rhine electrode short-circuited beforehand.

[0008] Moreover, each electrode pad is joined to the electrode which constitutes a surface acoustic wave filter by constituting the surface acoustic wave filter of a resonator mold using this package, and since adjustment of an inductance can be performed by short-circuiting and disconnecting the up Rhine electrode which constitutes an inductor if needed, adjustment of a passband property becomes easy.

[0009]

[Example] The example by this invention is explained with a drawing. The X-X sectional view of drawing 1 and drawing 3 of the top view of the surface acoustic wave filter using the package for electronic parts according [ drawing 1 ] to this invention and drawing 2 are the Y-Y sectional views of drawing 1 . The package 1 which consists of ceramics, such as an alumina, is two-room isolation construction, and is set to C1 from the separation belt part B which divides the 2nd room of C2 and each [ these ] \*\* the 1st room. The step 11 is formed in the

crosswise edge of a package inner circumference part and the separation belt part B, and the electrode pads 21, 22, 23, 24, 25, 26, 27, and 28 are formed in a part of this step 11. The screening electrode 12 grounded is formed in the pars basilaris ossis occipitalis of a package. Low attachment junction of the 1d (metal layer) of the metal frames with which the amount of [ of a package ] opening consists of covar is carried out. Above said step 11 of a separation belt part, inductors 41 and 42 are formed in one with the package by the ceramic laminating technique, and it is arranged between the piezo-electric substrate 31 which is the below-mentioned electronic-parts component, the electrode pad 29 with which the in-and-out force electrode of the crossover finger electrodes 31a and 32a on 32 is connected and the electrode pad 22 grounded, and 26.

[0010] Such a package made from a ceramic is manufactured in the following built-up sequence. 2nd frame-like ceramic layer 1b which laps with the part (equivalent to the above-mentioned separation belt part) which extends in a longitudinal direction in the direction center section of a short hand as well as the perimeter list of this 1st ceramic layer 1a is installed in the tabular upper part of 1st ceramic layer 1a which constitutes the lower part of a package. Between the electrode pads 22-29 of the part which the metallized layer equivalent to the above-mentioned electrode pad is prepared in a part of upper part of this 2nd ceramic layer 1b, and is equivalent to said separation belt part B, or between the electrode pads 26-29, two or more metallized layers of a narrow width line which constitute the lower Rhine electrodes 41a and 42a of an inductor are prepared at equal intervals aslant. 3rd ceramic layer 1c is prepared in the upper part of the metallized layer of the part equivalent to said separation belt part. A through tube small into the part corresponding to each edge of said lower Rhine electrode is prepared in this 3rd ceramic layer 1c, and the middle Rhine electrodes 41b and 42b are formed by attracting an electrode material also to this hole and making inner skin fix. This 3rd ceramic layer 1c is arranged so that the lower limit of the middle Rhine electrodes 41b and 42b and the edge of said lower Rhine electrodes 41a and 42a may be connected electrically. And the up Rhine

electrodes 41c and 42c of a narrow width line which connect respectively electrically the upper limit of the middle Rhine electrode prolonged from the end of a lower Rhine electrode and the upper limit of the middle Rhine electrode prolonged from the other end of an adjoining lower Rhine electrode are formed in the upper part of the 3rd ceramic layer equivalent to this separation belt part at equal intervals. Moreover, 3rd ceramic layer 1c of width of face smaller than the periphery width of face of the 2nd ceramic layer is prepared in the periphery upper part of said 2nd ceramic layer. In addition, the laminating of the 3rd ceramic layer which constitutes a package periphery, and the 3rd ceramic layer which constitutes the separation belt part of a package may be carried out at a process which could carry out the laminating at the same process, or is different, and it may change an ingredient and height. Low \*\* of the 1d of the periphery-like metal frames is carried out in the upper part of the 3rd ceramic layer. Thus, while making two electronic-parts component receipt rooms divided with the separation belt part by constituting a package, an inductor can be formed by the configuration to which said each Rhine electrode extended the perimeter spirally by using the 3rd ceramic layer as a core in the upper part of a separation belt part.

[0011] The piezo-electric substrates 31 and 32 which are electronic-parts components consist of sheet metal-like  $\text{LiNbO}_3$ , and are processed into the rectangle configuration, respectively. The reflector electrodes 31b, 31c, 32b, and 32c are formed in the front face of these piezo-electricity substrates 31 and 32 at crossover finger electrode 31a and 32a list, respectively. Each electrode on each piezo-electric substrate constitutes the resonator mold surface acoustic wave filter which comes to prepare a surface acoustic wave resonator in 2 juxtaposition. These piezo-electricity substrates 31 and 32 are installed in each receipt room of said package, and the pars basilaris ossis occipitalis of a package and the inferior surface of tongue of a piezo-electric substrate are joined with a conductive jointing material for corrugated fibreboard. and the electrode pad 28, the end of crossover finger electrode 31a and the other end of crossover finger



electrode 31a, and the electrode pad 29 -- similarly the electrode pad 29, the end of crossover finger electrode 32a and the other end of crossover finger electrode 32a, the electrode pad 24, reflector electrode 31b (reflector electrode 31c) and the electrode pad 21, and reflector electrode 32c (reflector electrode 32b) and the electrode pad 25 are electrically joined by the bonding wire 5, respectively. And the electrode pads 28 and 24 are drawn outside as an I/O electrode, and the electrode pads 21, 23, 25, and 27 are drawn outside as an earth electrode, respectively. In addition, although the electrode pad 22 connected through an inductor 41 from the electrode pad 29 or the electrode pad 26 connected through an inductor 42 is not illustrated, common connection of it is made with said electrode pad grounded within a package, and it is drawn outside. The metallic free wheel plate 6 is joined by said 1d of metal frames, seam welding, etc. in airtight.

[0012] Other examples are shown in the top view of drawing 4 . In addition, a jack per line is used about a part for the same structured division as the first example. In this example, the middle Rhine electrode has composition which extends the notching part formed in the side face of the 3rd ceramic layer used as a core, and this can prepare two or more bores in the condition of the green sheet before sintering, and can prepare the above-mentioned notching by cutting this bore part. A part or all has short-circuited the up Rhine electrodes 41c and 42c which constitute inductors 41 and 42 with the short circuit Rhine electrodes 41d and 42d on the field concerned. When adjusting a passband property, sequential fusing of this common Rhine electrode is carried out with laser etc., and it has the advantage which can adjust electrical characteristics more easily that what is necessary is just to stop cutting by the place used as a desired property. In addition, this invention is not applied only to the resonator mold surface acoustic wave filter shown in the above-mentioned example, and can be applied to the electronic parts with which others, such as a monolithic crystal filter, were compound-ized. Moreover, the wiring electrode pattern formed in the electrode pattern list of a resonator mold surface acoustic wave filter at the

package is not limited to the above-mentioned example, either, and should just carry out a selection design suitably according to desired electrical characteristics.

[0013]

[Effect of the Invention] the interior of the package for electronic parts -- a ceramic laminating technique and a metallizing technique -- the conductor of a coiled form [ layered product / ceramic ] -- since the inductor constituted on the road (Rhine electrode) is formed, a comparatively big area is assignable to formation of an inductor. Therefore, the degree of freedom of the design concerning many electric properties as inductors, such as spacing of the Rhine electrode and a number of turns, is large, and the inductor corresponding to RF-izing can be formed. It becomes unnecessary therefore, to newly prepare an inductor. Moreover, since the up Rhine electrode which forms an inductor is exposed, adjustment of an inductance can carry out very easily short-circuiting these up Rhine electrode or by disconnecting the up Rhine electrode short-circuited beforehand.

[0014] It becomes unnecessary moreover, to newly make external connection of the inductor by constituting a surface acoustic wave filter using this package. And since adjustment of an inductance can be performed by short-circuiting and disconnecting the up Rhine electrode which constitutes an inductor if needed, adjustment of a passband property becomes easy.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The top view showing the 1st example.

[Drawing 2] The X-X sectional view of drawing 1 .

[Drawing 3] The Y-Y sectional view of drawing 1 .

[Drawing 4] The top view showing other examples.

[Drawing 5] The top view showing the conventional example.

[Drawing 6] The Z-Z sectional view of drawing 5 .

[Description of Notations]

1 Package

31, 32, 7 Piezo-electric substrate

41 42 Inductor

41a, 42a Lower Rhine electrode

41b, 42b Middle Rhine electrode

41c, 42c Up Rhine electrode

41d, 42d Short circuit Rhine electrode

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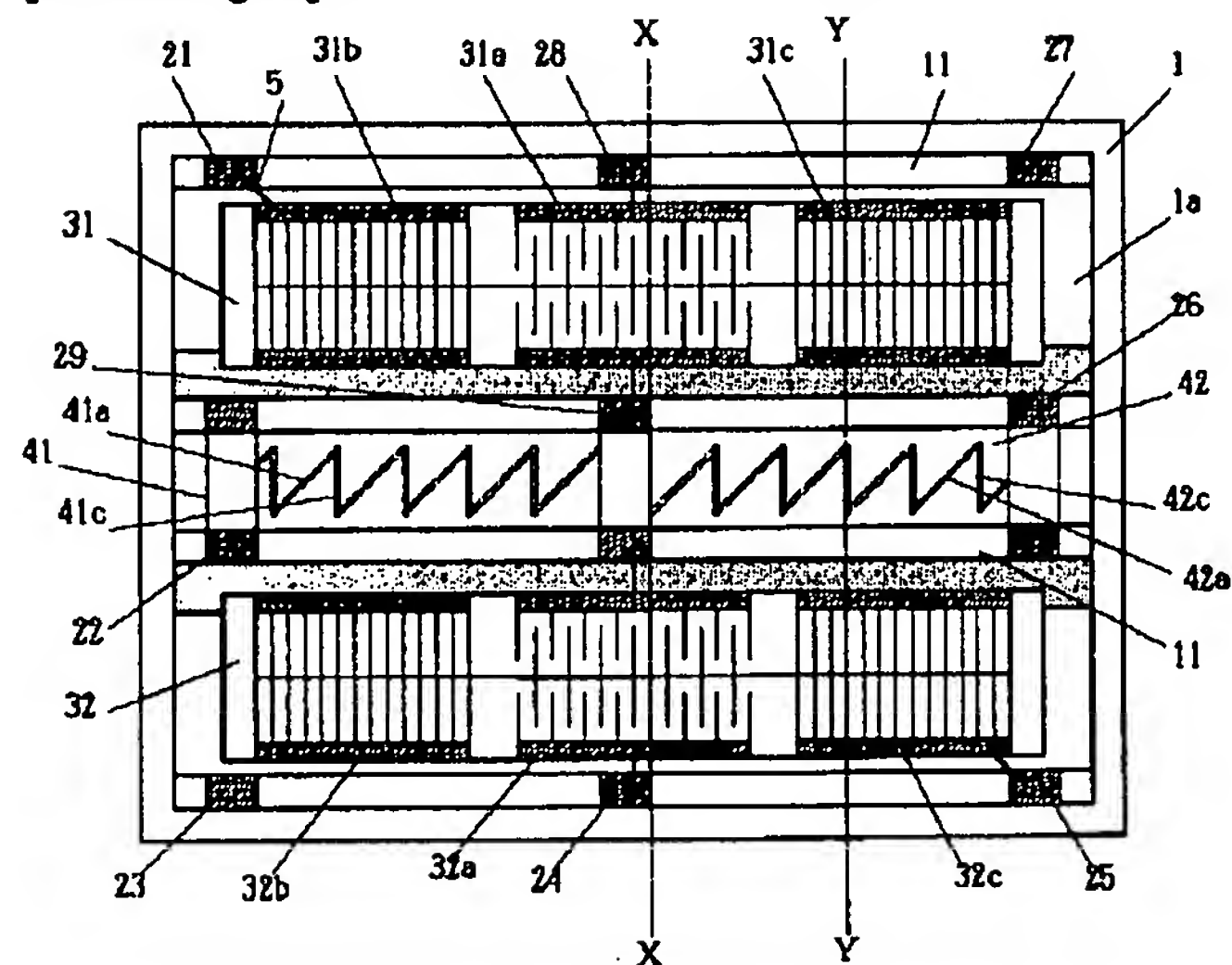
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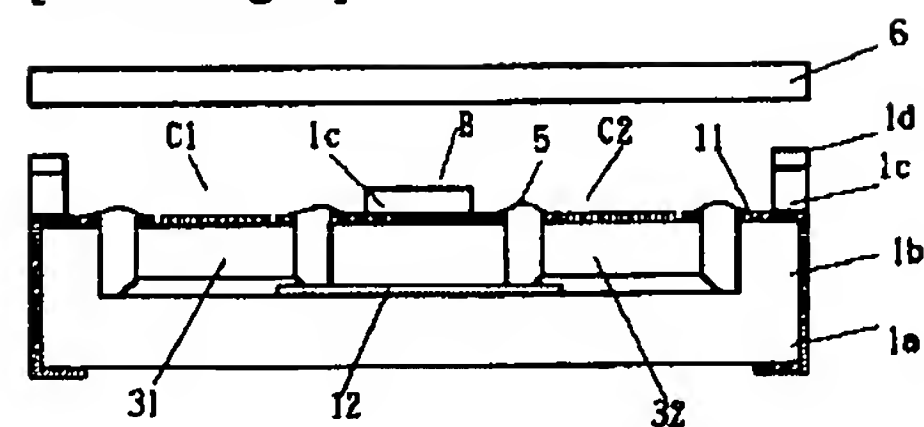
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## DRAWINGS

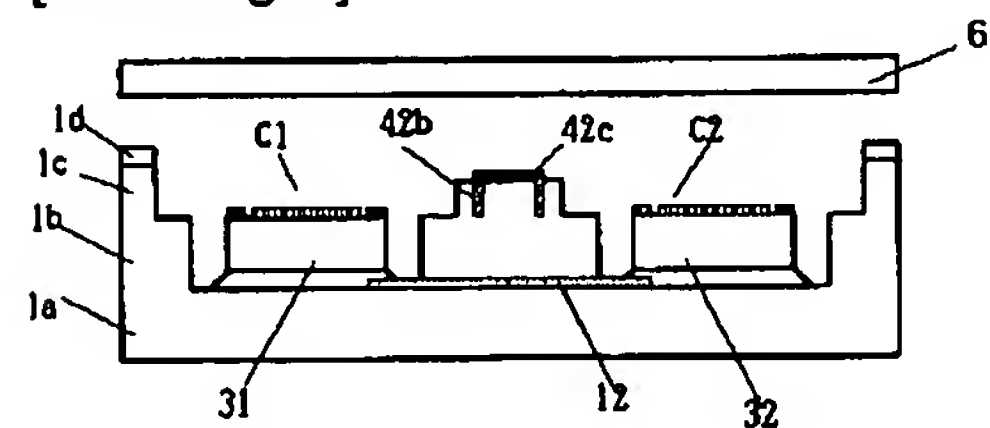
[Drawing 1]



[Drawing 2]

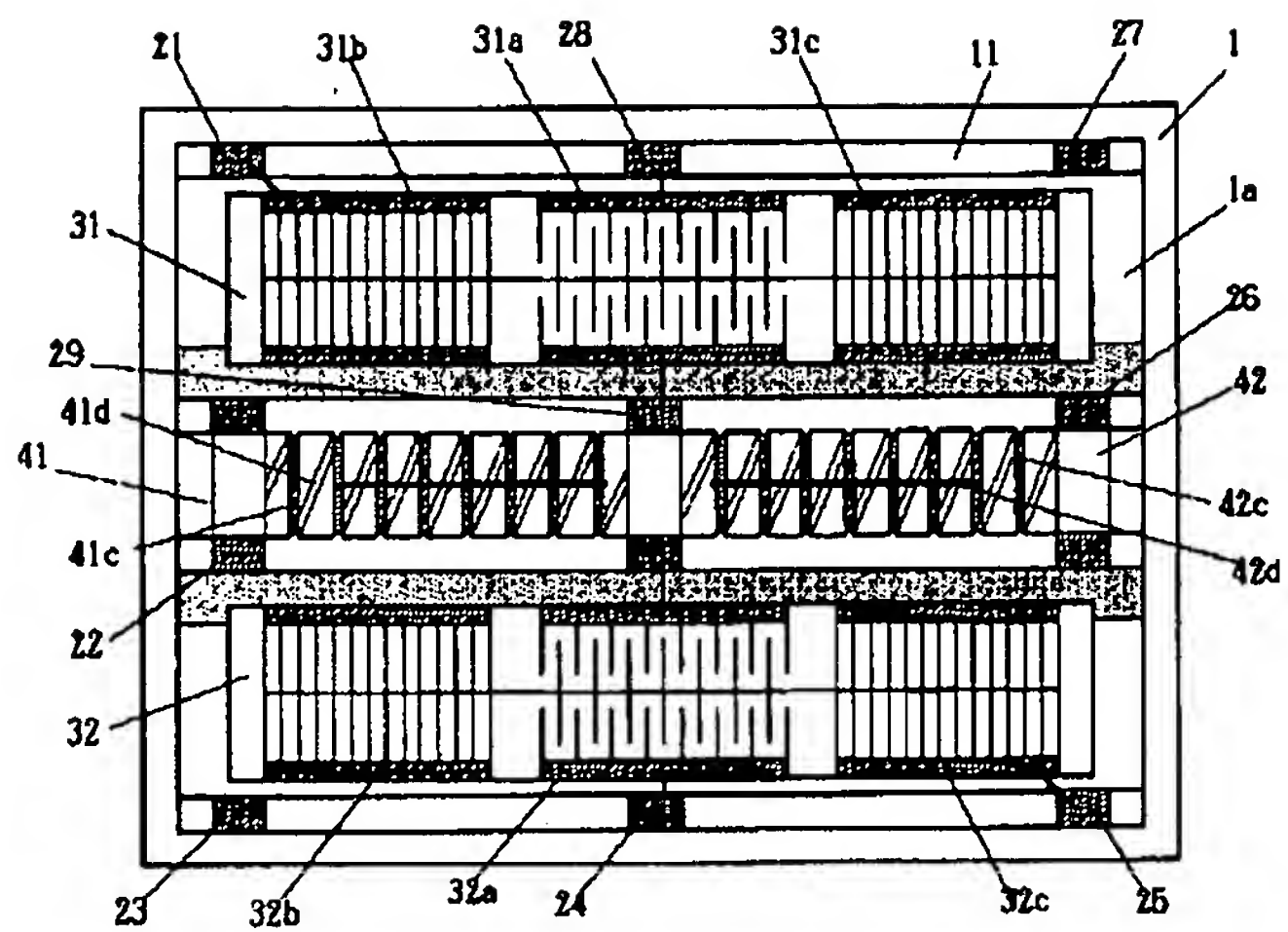


[Drawing 3]

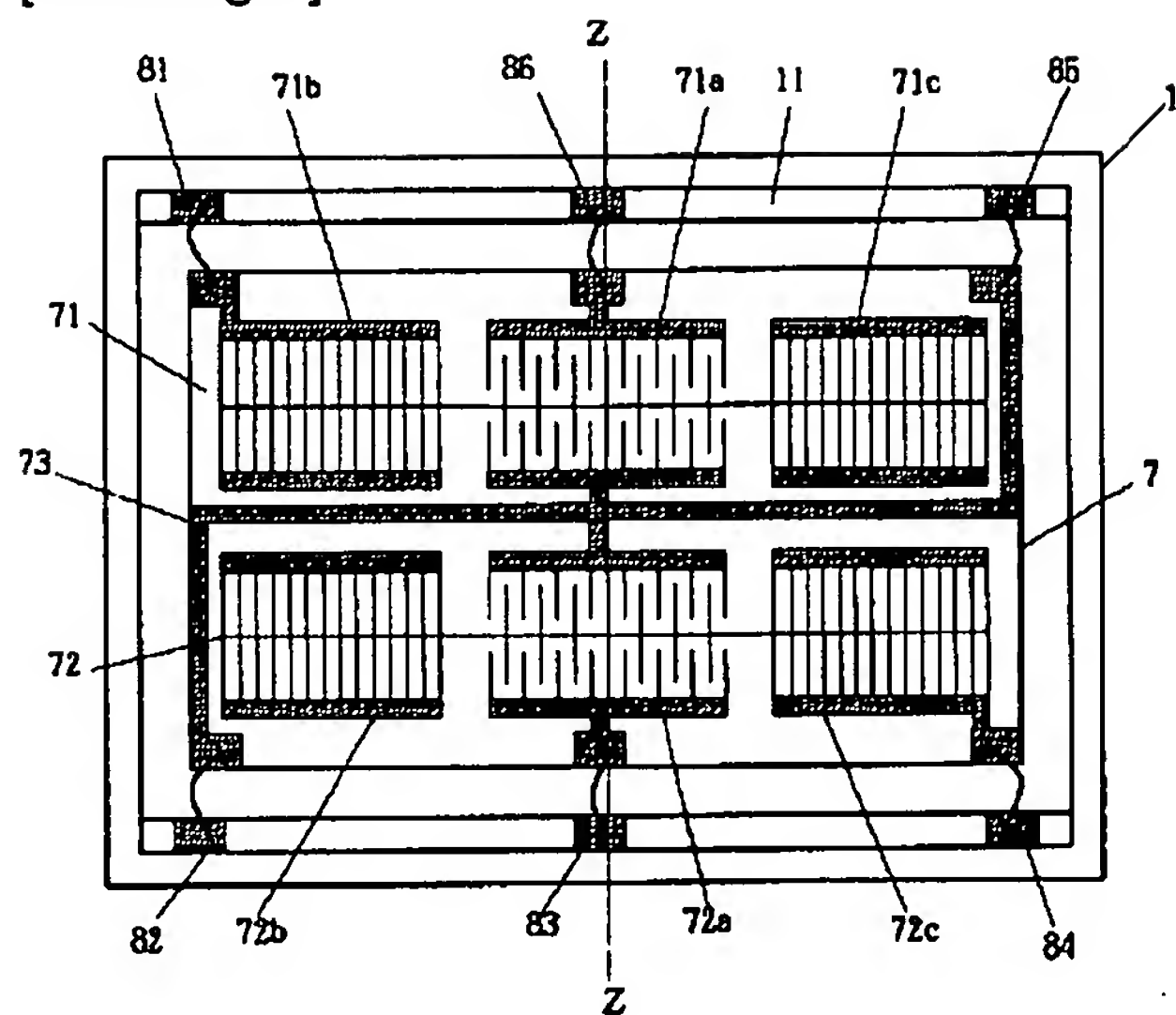


[Drawing 4]

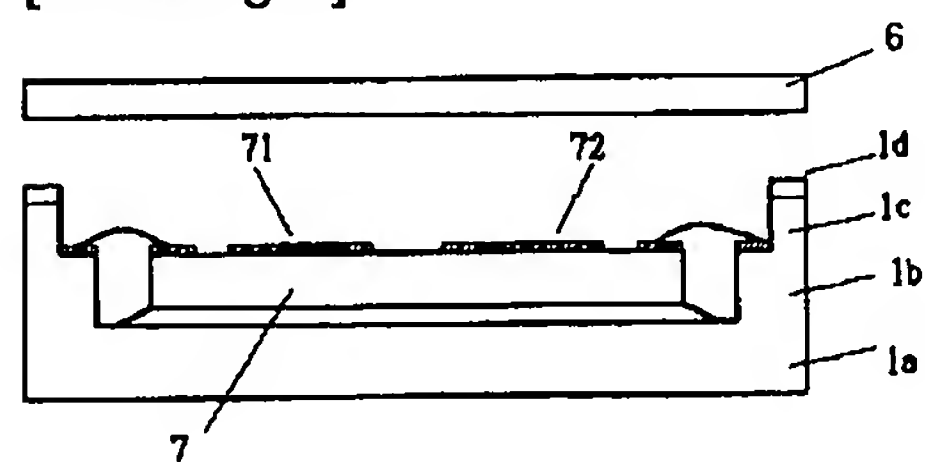




[Drawing 5]



[Drawing 6]



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